

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: October 26, 2020

TO: Sean Spencer – SCR/Fitchburg

FROM: Sarah Luck – SCR/Fitchburg

SUBJECT: Water Quality-Based Effluent Limitations for Reeseville Wastewater Treatment Facility
WPDES Permit No. WI-0028509-09

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using Chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from Reeseville Wastewater Treatment Facility in Dodge County. This municipal wastewater treatment facility (WWTF) discharges to the Beaver Dam River, located in the Beaver Dam River Watershed in the Upper Rock River Basin. This discharge is included in the Rock River TMDL as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at Outfall 001:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					2
BOD ₅			45 mg/L	30 mg/L	1
TSS				60 mg/L	1,4,8
pH	9.0 s.u.	6.0 s.u.			1
Ammonia Nitrogen					5
April	Variable		31.3 mg/L	21 mg/L	
May – October	Variable		42.7 mg/L	30.7 mg/L	
November – March	Variable		51.3 mg/L	35 mg/L	
Bacteria					6
Interim Limit				400 #/100 mL	
Fecal Coliform				geometric mean	
Final Limit				126 #/100 mL	
<i>E. coli</i>				geometric mean	
Residual Chlorine	38 µg/L		37 µg/L	37 µg/L	7
Chloride					1,3
Phosphorus					8,9
TBEL				1.0 mg/L	
Nitrite + Nitrate					10
Nitrogen, Total					10
Kjeldahl					
Total Nitrogen					10
Acute WET					11

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Monitoring in the fourth year of the permit term.

4. The TSS limit is a variance limit according to s. NR 210.07(2), Wis. Adm. Code, where aerated lagoons and stabilization ponds are the principal treatment processes.
5. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit of 9.4 mg/L. These limits apply year-round.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
$6.0 \leq \text{pH} \leq 6.1$	108	$7.0 < \text{pH} \leq 7.1$	66	$8.0 < \text{pH} \leq 8.1$	14
$6.1 < \text{pH} \leq 6.2$	106	$7.1 < \text{pH} \leq 7.2$	59	$8.1 < \text{pH} \leq 8.2$	11
$6.2 < \text{pH} \leq 6.3$	104	$7.2 < \text{pH} \leq 7.3$	52	$8.2 < \text{pH} \leq 8.3$	9.4
$6.3 < \text{pH} \leq 6.4$	101	$7.3 < \text{pH} \leq 7.4$	46	$8.3 < \text{pH} \leq 8.4$	7.8
$6.4 < \text{pH} \leq 6.5$	98	$7.4 < \text{pH} \leq 7.5$	40	$8.4 < \text{pH} \leq 8.5$	6.4
$6.5 < \text{pH} \leq 6.6$	94	$7.5 < \text{pH} \leq 7.6$	34	$8.5 < \text{pH} \leq 8.6$	5.3
$6.6 < \text{pH} \leq 6.7$	89	$7.6 < \text{pH} \leq 7.7$	29	$8.6 < \text{pH} \leq 8.7$	4.4
$6.7 < \text{pH} \leq 6.8$	84	$7.7 < \text{pH} \leq 7.8$	24	$8.7 < \text{pH} \leq 8.8$	3.7
$6.8 < \text{pH} \leq 6.9$	78	$7.8 < \text{pH} \leq 7.9$	20	$8.8 < \text{pH} \leq 8.9$	3.1
$6.9 < \text{pH} \leq 7.0$	72	$7.9 < \text{pH} \leq 8.0$	17	$8.9 < \text{pH} \leq 9.0$	2.6

6. Bacteria limits apply during the disinfection season of May through September. The fecal coliform interim limit will apply until the end of the compliance schedule when *E. coli* limits take effect. Additional final limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
7. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
8. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
Jan	48	78	1.61
Feb	54	88	2.15
March	48	78	2.21
April	48	79	1.76
May	48	78	1.64
June	48	79	1.60
July	48	78	1.34
Aug	48	78	1.62
Sept	48	79	1.76
Oct	48	78	1.76
Nov	48	79	1.59
Dec	48	78	1.40

9. The monthly average phosphorus limit is a technology-based limit (TBEL).
10. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen (total kjeldahl nitrogen and nitrate/nitrite) monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO₃), nitrite (NO₂), and total kjeldahl nitrogen (all expressed as N).
11. Two acute WET tests are recommended during the reissued permit term. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Sarah Luck (Sarah.Luck@wisconsin.gov) or Diane Figiel (Diane.Figiel@wisconsin.gov).

Attachments (4) – Narrative, Site Map, Ammonia Nitrogen Calculations, and Thermal Table



PREPARED BY:

Sarah Luck
Water Resources Engineer

Date: October 26, 2020

E-cc: Doris Thiele, Wastewater Engineer – SCR/Horicon
Tom Bauman, Regional Wastewater Supervisor – SCR/Fitchburg
Diane Figiel, Water Resources Engineer – WY/3

Water Quality-Based Effluent Limitations for Reeseville Wastewater Treatment Facility

WPDES Permit No. WI-0028509-09

Prepared by: Sarah Luck

PART 1 – BACKGROUND INFORMATION

Facility Description:

The wastewater treatment system consists of three aerated lagoons. From the lagoons, the wastewater flows via gravity to the Beaver Dam River for a continuous discharge. In 2014, the Village completed a project to upgrade the treatment system. The project included: expansion to the capacity of the existing aerated lagoon treatment system, installation of synthetic liners in the lagoons, and the replacement of the lagoon aeration system. Also included was the construction of a Multi-Stage Activated Biological Process (MSABP) to aid in the pre-treatment of Specialty Cheese's industrial process wastewater prior to discharge to the lagoon treatment system. The updated design flow of the facility is 0.2 MGD.

The Village of Reeseville Wastewater Treatment Facility serves a population of approximately 700 with one significant industrial contributor. Two public water supply wells provide drinking water for Reeseville residents.

Attachment #2 is a map of the area showing the approximate location of Outfall 001.

Existing Permit Limitations: The current permit, which expired on June 30, 2020, includes the following effluent limitations and monitoring requirements.

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						2
BOD ₅			45 mg/L	30 mg/L		1
TSS				60 mg/L		3
pH	9.0 s.u.	6.0 s.u.				1
Ammonia Nitrogen						4,5
April	Variable		31.3 mg/L	21 mg/L		
May – October	Variable		42.7 mg/L	30.7 mg/L		
November – March	Variable		51.3 mg/L	35 mg/L		
Fecal Coliform				400#/100 mL		1
May – September				geometric mean		
Residual Chlorine	38 µg/L					1
Chloride						2
Phosphorus				1.0 mg/L		3,5

Footnotes:

1. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
2. Monitoring only.
3. Additional phosphorus and TSS mass limitations are required in accordance with the wasteload allocations specified in the Rock River TMDL.

Month	Monthly Ave TSS Effluent Limit (lbs/day)	Weekly Ave TSS Effluent Limit (lbs/day)	Monthly Ave Total P Effluent Limit (lbs/day)
Jan	48	78	1.61
Feb	54	88	2.15
March	48	78	2.21
April	48	79	1.76
May	48	78	1.64
June	48	79	1.60
July	48	78	1.34
Aug	48	78	1.62
Sept	48	79	1.76
Oct	48	78	1.76
Nov	48	79	1.59
Dec	48	78	1.40

4. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values is included in the permit in place of the single limit. These limits apply year-round.

Effluent pH - su	NH ₃ -N Limit – mg/L	Effluent pH - su	NH ₃ -N Limit – mg/L
pH ≤ 7.5	No Limit	8.2 < pH ≤ 8.3	9.4
7.5 < pH ≤ 7.6	34*	8.3 < pH ≤ 8.4	7.8
7.6 < pH ≤ 7.7	29*	8.4 < pH ≤ 8.5	6.4
7.7 < pH ≤ 7.8	24*	8.5 < pH ≤ 8.6	5.3
7.8 < pH ≤ 7.9	20*	8.6 < pH ≤ 8.7	4.4
7.9 < pH ≤ 8.0	17	8.7 < pH ≤ 8.8	3.7
8.0 < pH ≤ 8.1	14	8.8 < pH ≤ 8.9	3.1
8.1 < pH ≤ 8.2	11	8.9 < pH ≤ 9.0	2.6

5. Limit(s) effective July 1, 2019.

Receiving Water Information:

- Name: Beaver Dam River
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm water sport fish community, non-public water supply.

Low Flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q₁₀ and 7-Q₂ values are from a memo dated 2/21/1997 from Eric Rortvedt to Bernie Robertson and are estimated at HWY 16 just south of Lowell, upstream of where Outfall 001 is located.

7-Q₁₀ = 5.0 cfs (cubic feet per second)

7-Q₂ = 11.53 cfs

Harmonic Mean Flow = 35 cfs using a drainage area of 237 mi² (drainage area estimate at Lowell)

Attachment #1

The Harmonic Mean has been estimated based on average flow and the 7-Q₁₀ using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).

The following monthly flow rates were estimated at USGS Site # 05425912 (located upstream of the Beaver Dam Wastewater Treatment Facility) on June 14, 2013. If the facility would like updated low flows, they can contract with USGS.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q ₁₀ (cfs)	11.2	15.6	21	6.2	13.8	4.5	4.9	4.4	3.4	4.0	8.3	11.2
7-Q ₂ (cfs)	42	80	85	27	25	22	10.1	10.2	8.2	10.8	23	29

- Hardness = 251 mg/L as CaCO₃. This value represents the geometric mean of data from the 2014-2018 WET testing performed at Beaver Dam Wastewater Treatment Facility.
- % of low flow used to calculate limits in accordance with s. NR 106.06 (4) (c) 5., Wis. Adm. Code: 25%. Historically the facility has been given 100% mixing, but there has been no formal mixing zone study to justify this. If the facility wishes to have limits calculated with greater than 25% mixing, a mixing zone study would need to be completed. However, any increase in limits as a result of increased mixing would need to show necessity in accordance with ch. NR 207, Wis. Adm. Code.
- Source of background concentration data: Metals data from the Rock River in Dodge county, just upstream of Davy Creek, is used for this evaluation because there is no data available for the Beaver Dam River. The Rock River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. The background mercury value is the geometric mean of all mercury data available for the Rock River. Background data for calculating effluent limitations for ammonia nitrogen and total phosphorus are described later.
- Multiple dischargers: There are several other dischargers to the Beaver Dam River; however, they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: The Beaver Dam River is listed as impaired for total phosphorus at the point of discharge. Please refer to the Site Map in Attachment #2.

Effluent Information:

- Flow Rate:
Annual average = 0.20 MGD (Million Gallons per Day)
For reference, the actual average flow from July 2015 through January 2020 was 0.15 MGD.
- Hardness = 297 mg/L as CaCO₃. This value represents the geometric mean of data from December 2019 and January 2020 (n=5) reported on the permit application.
- Acute dilution factor used in accordance with s. NR 106.06 (3) (c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water Source: Primarily domestic wastewater with water supply from wells; one industrial contributor that sends discharge through a pretreatment system.
- Additives: None.
- Effluent characterization: This facility is categorized as a minor municipality, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified

Attachment #1

in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus Ammonia, Chloride, Hardness, and Phosphorus.

	Chloride mg/L
1-day P ₉₉	316
4-day P ₉₉	290
30-day P ₉₉	226
Mean	195
Std	38.6
Sample size	48
Range	<100 - 325

“<” means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected results.

Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”.

The following table presents the average concentrations and loadings at Outfall 001 from July 2015 through January 2020 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6):

	Average Measurement	Average Mass Discharged
BOD ₅	53.2 mg/L	
TSS	52.4 mg/L*	20.1 lbs/day
pH field	7.6 s.u.	
Phosphorus	1.71 mg/L	2.09 lbs/day
Ammonia Nitrogen	5.31 mg/L*	
Residual chlorine	<100 µg/L	

*Results below the level of detection (LOD) were included as zeroes in calculation of average.

PART 2 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P₉₉) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q₁₀

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Adm. Code (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q₁₀ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards.

$$\text{Limitation} = \frac{(\text{WQC}) (Q_s + (1-f) Q_e) - (Q_s - f Q_e) (C_s)}{Q_e}$$

Where:

WQC = Acute toxicity criterion or secondary acute value according to ch. NR 105

Q_s = average minimum 1-day flow which occurs once in 10 years (1-day Q₁₀)

if the 1-day Q₁₀ flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q₁₀).

Q_e = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

C_s = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Reeseville Wastewater Treatment Facility, and the limits are set based on two times the acute toxicity criteria.

The following tables list the calculated water quality-based effluent limitations for this discharge along with the results of effluent sampling. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 4.00 cfs, (1-Q₁₀ (estimated as 80% of 7-Q₁₀)), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P ₉₉	1-day MAX. CONC.
Chlorine		19.0		38.1	7.61	<100		
Arsenic		340		679.6	135.9	<7.00		
Cadmium	297	35.9	0.02	71.8	14.4	<0.500		
Chromium	297	4396	2.48	8791.9	1758	<2.00		
Copper	297	43.3	2.22	86.6	17.3	11.1		
Lead	297	306		611.9	122.4	4.33		
Nickel	268	1080	2.29	2160.6	432	5.98		
Zinc	297	312	6.0	623.5	124.7	8.14		
Chloride (mg/L)		757	67	1514			316	325

* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q₁₀ flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)RECEIVING WATER FLOW = 1.25 cfs (¼ of the 7-Q₁₀), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK- GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P ₉₉
Chlorine		7.28		36.69	7.34	<100	
Arsenic		152.2		767	153.4	<7.00	
Cadmium	175	3.82	0.02	19.17	3.8	<0.500	
Chromium	251	280.72	2.48	1405	280.9	<2.00	
Copper	251	22.75	2.22	105.7	21.14	11.1	
Lead	251	68.14		343.4	68.7	4.33	
Nickel	251	113.70	2.29	564	112.7	5.98	
Zinc	251	269.19	6.0	1332	266.5	8.14	
Chloride (mg/L)		395	67	1720			290

* The indicated hardness may differ from the receiving water hardness because the receiving water hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the chronic criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

Monthly Average Limits based on Wildlife Criteria (WC)

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 8.64 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK- GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.02	10700	2140.1	<0.500
Chromium (+3)	3818000	2.48	110420957	22084191	<2.00
Lead	140		4049	809.8	4.33
Nickel	43000	2.29	1243546	248709	5.98

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 8.64 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HCC	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3	384.7	76.93	<7.00

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations: Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are not required.

Total Residual Chlorine – Because chlorine is added as a disinfectant, effluent limitations are recommended to assure proper operation of the de-chlorination system. Section NR 210.06(2)(b), Wis. Adm. Code, states, “When chlorine is used for disinfection, the daily maximum total residual chlorine concentration of the discharge may not exceed 0.10 mg/L.” Because the WQBELs are more restrictive, they are recommended instead. Specifically, **a daily maximum limit of 38 µg/L (38.1, rounded to two significant figures) is required.** Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required.

In cases where the calculated weekly average limit is more restrictive than the calculated acute daily limit, the weekly average limit shall be included in the permit because daily limit is not protective of chronic water quality concerns. Furthermore, additional limits are required to meet the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code, which state whenever a weekly average limitation is determined necessary to protect water quality, a monthly average limitation shall also be included in the permit and set equal to the weekly average limit unless a more restrictive limit is already determined necessary to protect water quality. Since the calculated water quality-based limit is **37 µg/L (36.7, rounded to two significant figures) is more restrictive than the daily limit, it shall be included in the permit as a weekly and monthly average.**

Chloride – Considering available effluent data from the current permit term (February 2019 through December 2019), the 1-day P₉₉ chloride concentration is 316 mg/L, and the 4-day P₉₉ of effluent data is 290 mg/L.

These effluent concentrations are below the calculated WQBELs for chloride; therefore, **no effluent limits are needed. Chloride monitoring is recommended during the fourth year of the permit term** to ensure that a minimum of 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Mercury – The permit application did not require monitoring for mercury because the Reeseville Wastewater Treatment Facility is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3., Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, “there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5).” Lagoon solids testing was required in 2019 but was not completed. As stated in the inspection report letter from the Department dated January 5, 2020, **lagoon solids sampling should be completed as soon as practicable.**

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. The current permit has daily maximum, weekly average, and monthly average limits. These limits are re-evaluated at this time due to the following changes:

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- The maximum expected effluent pH has changed.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC):

Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation.

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - \text{pH})})] + [B \div (1 + 10^{(\text{pH} - 7.204)})]$$

Where:

A = 0.411 and B = 58.4 for a Warm Water Sport fishery, and
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 1676 sample results were reported from July 2015 through January 2020. The maximum reported value was 8.5 s.u. (Standard pH Units). The effluent pH was 8.3 s.u. or less 99% of the time. The 1-day P₉₉, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 8.3 s.u. and the mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 8.3 s.u. Therefore, a value of 8.3 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 8.3 s.u. into the equation above yields an ATC = 4.71 mg/L.

Potential changes to daily maximum Ammonia Nitrogen effluent limitations:

Subchapter IV of ch. NR 106, Wis. Adm. Code (effective September 1, 2016) specifies methods for the use of the 1-Q₁₀ receiving water low flow to calculate daily maximum ammonia nitrogen limits if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q₁₀ (estimated as 80 % of 7-Q₁₀) and the 2×ATC approach are shown below.

	Ammonia Nitrogen Limit mg/L
2×ATC	9.4
1-Q ₁₀	65

The 2×ATC method yields the most stringent limits for Reeseville Wastewater Treatment Facility.

The current permit has variable daily maximum effluent limits based on effluent pH. Presented below is a table of daily maximum limitations corresponding to various effluent pH values.

Attachment #1

Daily Maximum Ammonia Nitrogen Limits – WWSF, WWFF & LFF

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	108	7.0 < pH ≤ 7.1	66	8.0 < pH ≤ 8.1	14
6.1 < pH ≤ 6.2	106	7.1 < pH ≤ 7.2	59	8.1 < pH ≤ 8.2	11
6.2 < pH ≤ 6.3	104	7.2 < pH ≤ 7.3	52	8.2 < pH ≤ 8.3	9.4
6.3 < pH ≤ 6.4	101	7.3 < pH ≤ 7.4	46	8.3 < pH ≤ 8.4	7.8
6.4 < pH ≤ 6.5	98	7.4 < pH ≤ 7.5	40	8.4 < pH ≤ 8.5	6.4
6.5 < pH ≤ 6.6	94	7.5 < pH ≤ 7.6	34	8.5 < pH ≤ 8.6	5.3
6.6 < pH ≤ 6.7	89	7.6 < pH ≤ 7.7	29	8.6 < pH ≤ 8.7	4.4
6.7 < pH ≤ 6.8	84	7.7 < pH ≤ 7.8	24	8.7 < pH ≤ 8.8	3.7
6.8 < pH ≤ 6.9	78	7.8 < pH ≤ 7.9	20	8.8 < pH ≤ 8.9	3.1
6.9 < pH ≤ 7.0	72	7.9 < pH ≤ 8.0	17	8.9 < pH ≤ 9.0	2.6

Section NR 106.33(2), Wis. Adm. Code, was updated effective September 1, 2016. As a result, seasonal 20 and 40 mg/L thresholds for including ammonia limits in municipal discharge permits are no longer applicable under current rules. As such, the table has been expanded from the table in the current permit to included ammonia nitrogen limits throughout the pH range.

Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)

The weekly and monthly average ammonia nitrogen limits calculation from the previous memo do not change because there have been no changes in the effluent and receiving water flow rates. The calculations from the facility planning WQBEL memo are shown in Attachment #3.

Effluent Data

The following table evaluates the statistics based upon ammonia data reported from July 2015 through January 2020, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Reeseville Wastewater Treatment Facility permit for the respective month ranges. That need is determined by calculating 99th upper percentile (or P₉₉) values for ammonia during each of the month ranges and comparing the daily maximum values to the daily maximum limit.

Ammonia Nitrogen mg/L	April	May – October	November – March
1-day P ₉₉	13.3	22.9	20.1
4-day P ₉₉	7.95	12.4	12.5
30-day P ₉₉	5.25	6.69	8.58
Mean*	4.02	4.31	6.77
Std	2.59	4.72	3.84
Sample size	16	112	92
Range	0.54 - 9.09	0.02 - 20.88	<0.02 - 15.24

*Values lower than the level of detection were substituted with a zero.

Based on this comparison, daily limits are required year-round.

Attachment #1

The permit currently has daily, weekly, monthly limits. Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

(b) If a permittee is subject to an ammonia limitation in an existing permit, the limitation shall be included in any reissued permit. Ammonia limitations shall be included in the permit if the permitted facility will be providing treatment for ammonia discharges.

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR BACTERIA

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Code became effective which replace fecal coliform limits with new *Escherichia coli* (*E. coli*) limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.
2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

E. coli monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because Reeseville Wastewater Treatment Facility's permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

These limits are required during May through September. No changes are recommended to the current recreational period and the required disinfection season.

Interim Limit

At this time, there is no effluent *E. coli* data available to determine if these limits are currently met. The permit will include a compliance schedule to meet these limits. During the compliance schedule, an interim limit applies to prevent back-sliding from the current level of disinfection during the compliance schedule period. Therefore, the current **fecal coliform limit shall be included in the reissued permit as an interim limit of 400 counts/100 mL as a monthly geometric mean.**

PART 5 – PHOSPHORUS & TOTAL SUSPENDED SOLIDS

Technology Based Phosphorus Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of Total Phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because Reeseville Wastewater Treatment Facility currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent water quality-based concentration limit is given.

In addition, the need for a WQBEL for phosphorus must be considered.

Phosphorus Water Quality-Based Effluent Limits (WQBEL)

Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to s. NR 102.06, Wis. Adm. Code, which establish phosphorus standards for surface waters. Subchapter III of NR 217, Wis. Adm. Code, establishes procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

TMDL Limits – Phosphorus

The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices, can be found at:

http://dnr.wi.gov/topic/TMDLs/RockRiver/Final_Rock_River_TMDL_Report_with_Tables.pdf

The monthly average total phosphorus (Total P) effluent limits in lbs/day are calculated based on the monthly phosphorus wasteload allocation (WLA) given in pounds per month as suggested in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* dated April 15, 2013. The WLA for this facility is found in the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin* report dated July 2011. These limits are equivalent to concentrations ranging from 0.80 mg/L to 1.32 mg/L at the facility design flow of 0.2 MGD. **Monthly average mass effluent limits in accordance with the following table are recommended for this discharge.**

Total Phosphorus Effluent Limitations

Month	Monthly Total P WLA ¹ (lbs/month)	Days Per Month	Monthly Ave Total P Effluent Limit ² (lbs/day)
Jan	49.84	31	1.61
Feb	60.25	28	2.15
March	68.37	31	2.21
April	52.90	30	1.76
May	50.86	31	1.64
June	48.06	30	1.60
July	41.41	31	1.34
Aug	50.12	31	1.62
Sept	52.81	30	1.76
Oct	54.48	31	1.76
Nov	47.79	30	1.59
Dec	43.27	31	1.40

Footnotes:

1- Rock River TMDL Appendix P. Monthly Total Phosphorus Allocations by Wastewater Treatment Facility (p. 147)

2- Monthly average Total P effluent limit (lbs/day) = monthly Total P WLA (lbs/month) ÷ days per month

Point of Discharge Limits – Phosphorus

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality-based effluent limit for phosphorus in addition to, or in lieu of, a s. NR 217.13 WQBEL in a WPDES permit. Because the Rock River Basin TMDL was developed to only protect and improve the

Attachment #1

water quality of phosphorus impaired waters within the basin at the time, the need for s. NR 217.13 WQBELs must also be evaluated to address local water quality concerns.

Since the discharge from Reeseville Wastewater Treatment Facility flows directly into the Beaver Dam River, which was listed as phosphorus impaired at the time of the TMDL development, the TMDL-based limit can be included in the WPDES permit absent the s. NR 217.13 WQBEL since the TMDL limits are protective of the receiving water. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13 WQBEL unless these reductions are likely to occur.

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from July 2015 through January 2020 and February 2018 through January 2020, which is when the pretreatment program went online. Data since February 2018 is considered to be most representative of current conditions.

	Phosphorus 2015-2020 mg/L	Phosphorus 2018-2020 mg/L
1-day P ₉₉	6.08	1.82
4-day P ₉₉	3.55	1.11
30-day P ₉₉	2.28	0.76
Mean	1.71	0.60
Std	1.19	0.35
Sample size	220	96
Range	0.08 - 5.38	0.08 - 2

	Phosphorus (February 2018 – January 2020) lbs/day											
	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Mean	0.98	0.65	0.62	1.03	0.73	1.18	0.85	0.78	0.55	0.54	0.46	0.43
Std	0.96	0.29	0.14	0.30	0.29	0.69	0.52	0.45	0.33	0.19	0.08	0.20
Sample size	8	8	8	8	8	8	8	8	8	8	8	8
Range	0.37 - 3.23	0.285 - 1.13	0.49 - 0.871	0.688 - 1.53	0.4 - 1.31	0.393 - 2.25	0.25 - 1.5	0.44 - 1.68	0.12 - 1.14	0.23 - 0.87	0.33 - 0.55	0.29 - 0.9

Comparing the averages of the reported effluent mass data to the monthly average TMDL limits, the mass limits are met each month.

Phosphorus Mass Limits

Because the discharge is to a surface water that is impaired and has an approved TMDL, mass limits are required pursuant to s. NR 217.14(1)(a), Wis. Adm. Code. **The mass limits given in the TMDL allocation satisfy this requirement.**

TMDL Limits - Total Suspended Solids

The Rock River TMDL also has wasteload allocations (WLA) for total suspended solids (TSS). The current permit includes a monthly average limit of 60 mg/L which equates to 100 lbs/day at the facility

design flow.

Monthly average and weekly average mass effluent limitations should be included in the permit according to the table below, along with the currently imposed concentration limit. 29 – 32 mg/L as a monthly average and 47 – 53 mg/L as a weekly average at the facility design flow of 0.2 MGD.

Total Suspended Solids (TSS) Effluent Limitations

Month	Monthly TSS WLA ¹ (tons/month)	Days Per Month	Monthly Ave TSS Effluent Limit ² (lbs/day)	Weekly Ave TSS Effluent Limit ³ (lbs/day)
Jan	0.74	31	48	78
Feb	0.75	28	54	88
March	0.74	31	48	78
April	0.72	30	48	79
May	0.74	31	48	78
June	0.72	30	48	79
July	0.74	31	48	78
Aug	0.74	31	48	78
Sept	0.72	30	48	79
Oct	0.74	31	48	78
Nov	0.72	30	48	79
Dec	0.74	31	48	78

Footnotes:

1- Appendix Q. Monthly Total Suspended Solids Allocations by Wastewater Treatment Facility (p. 149)

2- Monthly average TSS effluent limit (lbs/day) = maximum monthly TSS WLA (tons/month) ÷ days per month x 2,000 lbs/ton

3- Weekly average effluent limit (lbs/day) = monthly average limit (lbs/day) x multiplier of 1.53

The multiplier used in the weekly average limit calculation was determined according to implementation guidance.

$$\text{CV (coefficient of variation)} = \text{Standard deviation of effluent data} \div \text{Mean of effluent data}$$

$$\text{CV} = 31 \text{ mg/L} \div 52 \text{ mg/L} = 0.59$$

Using TSS effluent data from the last five years, the multiplier used in the weekly average limit calculation was determined according to implementation guidance. A coefficient of variation was calculated to be 0.59 as seen above. Weekly TSS monitoring is specified in the current permit and it is believed this monitoring frequency will remain the same. Based on these two variables, a multiplier of 1.64 was used.

Limits based on a WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the following table lists the statistics for Total Suspended Solids discharge as both a concentration and a mass. Mass data is based on concentration sampling paired with actual flow data during the same time period.

Attachment #1

	TSS (mg/L)	TSS (lbs/day)
1-day P ₉₉	161.7	95.2
4-day P ₉₉	98.8	52.3
30-day P ₉₉	67.0	29.6
Mean	52.4*	20.0
Std	31.1	19.3
Sample Size	221	220
Range	11.5 - 229.5	1.4 - 123.7

*Results below the level of detection (LOD) were included as zeroes in calculation of average.

If there is a change in monitoring frequency, the stated limits should be reevaluated.

PART 6 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from July 2015 through January 2020.

Reeseville last monitored effluent temperature from July 2013 through June 2014 (shown below). This data is still considered representative.

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	36	36	NA	120
FEB	39	39	NA	120
MAR	48	48	NA	120
APR	54	54	79	120
MAY	60	60	116	120
JUN	66	67	107	120
JUL	75	77	119	120

Attachment #1

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
AUG	79	79	NA	120
SEP	75	75	95	114
OCT	70	70	86	120
NOV	62	62	100	120
DEC	44	44	NA	120

NA means the calculated limit exceeds the daily maximum limit.

Reasonable Potential

Permit limits for temperature are recommended based on the procedures in s. NR 106.56, Wis. Adm. Code.

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute WQBEL. The representative daily maximum effluent temperature is the greater of the following:
 - (a) The highest recorded representative daily maximum effluent temperature
 - (b) The projected 99th percentile of all representative daily maximum effluent temperatures
- A sub-lethal limitation for temperature is recommended for each month in which the representative weekly average effluent temperature for that month exceeds the weekly average WQBEL. The representative weekly average effluent temperature is the greater of the following:
 - (a) The highest weekly average effluent temperature for the month.
 - (b) The projected 99th percentile of all representative weekly average effluent temperatures for the month

Based on the data above and data from similar municipal treatment systems in the area, it is not expected that effluent temperatures would exceed the calculated limits. Therefore, **no temperature limits or monitoring is recommended**. The complete thermal table used for this calculation is in Attachment #4.

PART 7 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the WET Program Guidance Document (October 29, 2019).

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour

Attachment #1

exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC₅₀ (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09 (2) (b), Wis. Adm Code.

- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC₂₅ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09 (3) (b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 20% shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$\text{IWC (as \%)} = Q_e \div \{(1 - f) Q_e + Q_s\} \times 100$$

Where:

Q_e = annual average flow = 0.2 MGD = 0.31 cfs

f = fraction of the Q_e withdrawn from the receiving water = 0

Q_s = 1/4 of the 7- Q_{10} = 5 cfs \div 4 = 1.25 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

The WET Checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The Checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The Checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the Checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET Checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET Checklist, see Chapter 1.3 of the WET Guidance Document: <http://dnr.wi.gov/topic/wastewater/WETguidance.html>.

WET Checklist Summary

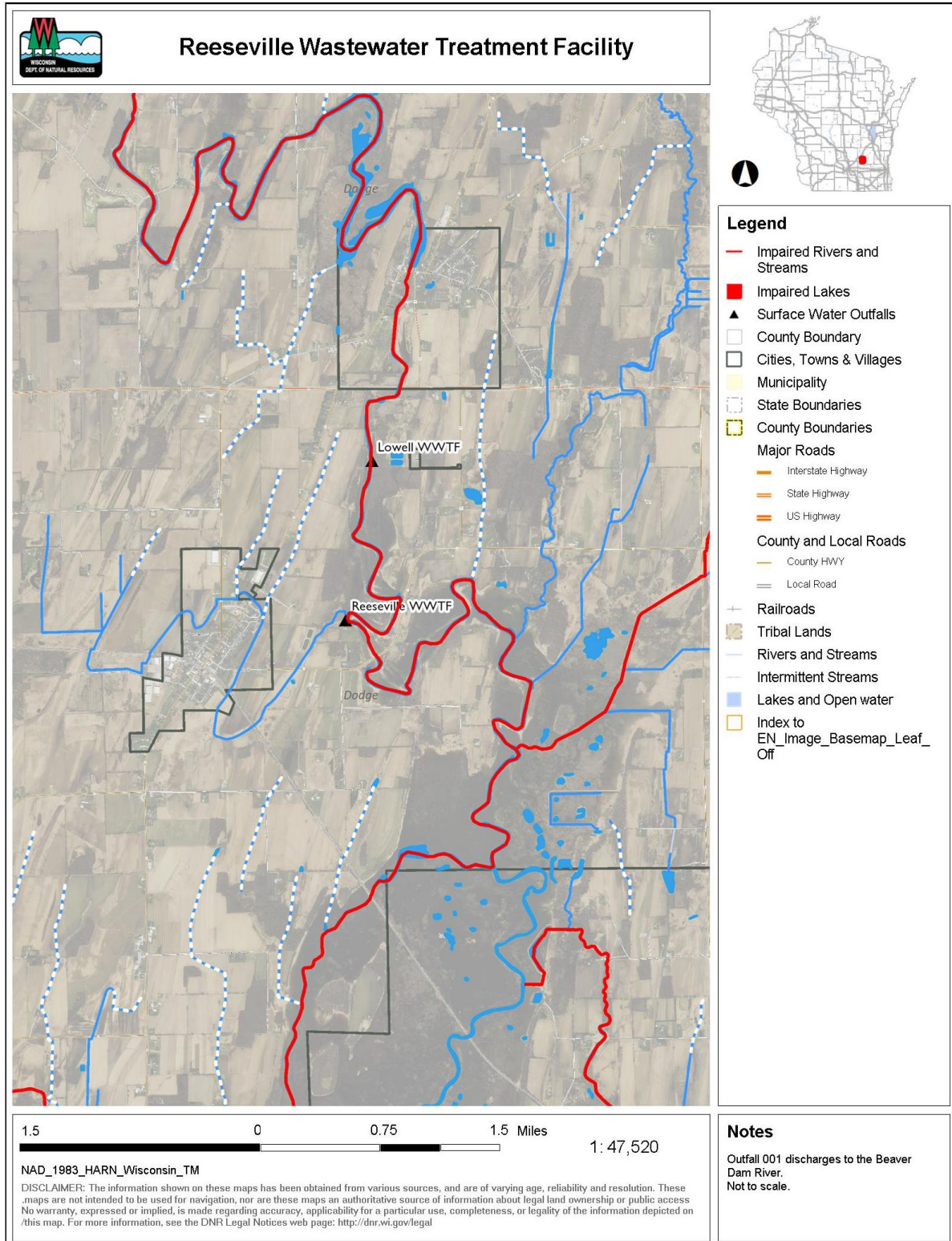
	Acute	Chronic
AMZ/IWC	Not Applicable. 0 Points	IWC = 20% 0 Points
Historical Data	No data available. 5 Points	No data available. 5 Points
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. 0 Points	Same as Acute. 0 Points
Receiving Water Classification	WWSF 5 Points	Same as Acute. 5 Points

Attachment #1

	Acute	Chronic
Chemical-Specific Data	No limits based on ATC; ammonia nitrogen and chlorine limits carried over from previous term; copper, lead, nickel, and zinc detected. Additional Compounds of Concern: None. 3 Points	No limits based on CTC; ammonia nitrogen and chlorine limits carried over from previous term; copper, lead, nickel, and zinc detected. Additional Compounds of Concern: None. 3 Points
Additives	1 Biocides (chlorine) and no Water Quality Conditioners added. P treatment chemical other than Ferric Chloride (FeCl), Ferrous Sulfate (FeSO ₄), or alum used: No 3 Points	All additives used more than once per 4 days. 3 Points
Discharge Category	Specialty Cheese. 5 Points	Same as Acute. 5 Points
Wastewater Treatment	Secondary or Better 0 Points	Same as Acute. 0 Points
Downstream Impacts	No impacts known. 0 Points	Same as Acute. 0 Points
Total Checklist Points:	21 Points	21 Points
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term (year 2, 4, 6, etc.)	2 tests during permit term (year 2, 4, 6, etc.)
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above, **two acute and no chronic WET tests are recommended in the reissued permit**. No chronic WET testing is a deviation from the WET checklist recommendation because the potential for effluent toxicity is believed to be very low. Toxic detects were within reasonable ranges and there is a robust pretreatment system installed to treat the wastewater from Specialty Cheese, which is the only industrial contributor. Acute tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

Attachment #2 Site Map



Ammonia Nitrogen Calculations from the Facility Planning WQBEL Memo Dated June 26, 2012

A 99th percentile or a reasonable maximum value may be used for effluent pH to calculate the ammonia limit depending on the number of results available, the variability of those results, and the potential for outlier values. An effluent variability analysis was conducted according to the procedures of s. NR 106.05(5) and resulted in the P99 of 8.2 s.u. for effluent pH.

AMMONIA (as N) LIMITS		
CLASSIFICATION:	WWSF	
EFFLUENT FLOW (mgd):	0.2	
EFFLUENT FLOW (cfs):	0.309	
MAX. EFFLUENT pH (s.u.):	8.20	
BACKGROUND INFORMATION:		
	<i>May-October</i>	<i>Nov.- April</i>
7Q10 (cfs)	5	5
7Q2 (cfs)	11.35	11.35
Ammonia (mg/L)	0.07	0.17
Temperature (deg C)	23	3
pH (std. units)	8.21	7.97
% of river flow used:	100	25
Reference weekly flow:	5	1.25
Reference monthly flow:	9.6475	2.411875
CRITERIA (in mg/L):		
4-day Chronic (@ backgrd. pH):		
early life stages present	2.55	6.35
early life stages absent	2.55	10.31
30-day Chronic (@ backgrd. pH)		
early life stages present	1.02	2.54
early life stages absent	1.02	4.12
EFFLUENT LIMITS (in mg/L):		
Weekly average		
early life stages present	42.68	31.32
early life stages absent		51.28
Monthly average		
early life stages present	30.68	21.01
early life stages absent		34.95

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	Reeseville WWTF	7-Q₁₀:	5	cfs	Temp Dates	Flow Dates
Outfall(s):	001	Dilution:	25%		Start:	07/01/13
Date Prepared:	10/26/2020	f:	0		End:	06/30/14
Design Flow (Q_e):	0.20	Stream type:	Small warm water sport or forage fish co ▼			
Storm Sewer Dist.	0	Qs:Q_e ratio:	4.0	:1		
		Calculation Needed?	YES			

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs) (cfs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)		(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	11.2	0.204	0.222	0	36	36	NA	120
FEB	34	50	76	15.6	0.260	0.266	0	39	39	NA	120
MAR	38	52	77	21.0	0.260	0.291	0	48	48	NA	120
APR	48	55	79	6.2	0.289	0.344	0	54	54	79	120
MAY	58	65	82	13.8	0.305	0.373	0	60	60	116	120
JUN	66	76	84	4.5	0.238	0.267	0	66	67	107	120
JUL	69	81	85	4.9	0.251	0.317	0	75	77	119	120
AUG	67	81	84	4.4	0.240	0.317	0	79	79	NA	120
SEP	60	73	82	3.4	0.326	0.373	0	75	75	95	114
OCT	50	61	80	4.0	0.290	0.467	0	70	70	86	120
NOV	40	49	77	8.3	0.236	0.266	0	62	62	100	120
DEC	35	49	76	11.2	0.286	0.467	0	44	44	NA	120